

1 **WE CLAIM:**

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A switched node for use in a computer network comprising:

- 2 (a) switching circuitry comprising more than two bi-directional ports for simultaneously
3 transmitting data in multiple dimensions through the computer network;
4 (b) a disk for storing data and a head actuated over the disk for writing data to and
5 reading data from the disk; and
6 (c) a reservation facility for reserving resources associated with data read from the disk
7 and written to the disk to support a predetermined Quality-of-Service constraint with
8 respect to data transmitted through the computer network.

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1 2. The switched node of claim 1, wherein the resources comprise memory for buffering
2 data.

1 3. The switched node of claim 1, wherein the switching circuitry comprises a plurality of
2 virtual lanes and the resources comprise at least one of the virtual lanes.

1 4. The switched node of claim 3, wherein each virtual lane comprises a predetermined
2 priority level.

1 5. The switched node of claim 3, wherein data is queued within each virtual lane in order of
2 arrival into the switched node.

1 6. The switched node of claim 3, wherein data is queued within each virtual lane with
2 respect to transmission deadlines associated with the data.

1 7. The switched node of claim 1, wherein the switching circuitry comprises processing
2 circuitry and the resources comprise at least part of the processing circuitry.

1 8. The switched node of claim 1, wherein:

- 2 (a) the switching circuitry comprises linking circuitry for linking to other switched nodes

3 in the computer network;

4 (b) the linking circuitry comprises a limited bandwidth; and

5 (c) the resources comprise at least part of the linking circuitry bandwidth.

1 9. The switched node of claim 1, wherein:

2 (a) the switching circuitry comprises adapter circuitry for connecting to an external
3 entity; and

4 (b) the resources comprise at least part of the adapter circuitry.

1 10. The switched node of claim 1, wherein the reservation facility limits movement of the
2 head so as to constrain the head to a predetermined region of the disk, thereby reserving a
3 resource within the switched fabric storage node.

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- 1 11. A method of reserving resources in a computer network to support a predetermined
2 Quality-of-Service constraint with respect to a new access request to transmit data
3 between a disk drive and a client computer, the computer network comprising a plurality
4 of interconnected computer devices including a plurality of disk drives, each disk drive
5 comprising a head and a disk, the method comprising the steps of:
6 (a) finding at least one disk drive out of the plurality of disk drives that can service the
7 new access request while supporting the Quality-of-Service constraint for the new and
8 existing access requests; and
9 (b) reserving resources within the at least one disk drive to service the new access
10 request.
12. The method of reserving resources as recited in claim 11, wherein the resources comprise
memory for buffering data.
13. The method of reserving resources as recited in claim 11, wherein the resources comprise
network circuitry for communicating with the computer network.
14. The method of reserving resources as recited in claim 13, wherein:
15 (a) the network circuitry comprises multi-port switching circuitry for simultaneously
16 transmitting data in multiple dimensions through the computer network; and
17 (b) the resources comprise a virtual lane within the multi-port switching circuitry.
15. The method of reserving resources as recited in claim 14, wherein each virtual lane
comprises a predetermined priority level.
16. The method of reserving resources as recited in claim 14, wherein data is queued within
each virtual lane in order of arrival into the switched node.
17. The method of reserving resources as recited in claim 14, wherein data is queued within
each virtual lane with respect to transmission deadlines associated with the data.

1 18. The method of reserving resources as recited in claim 14, wherein the multi-port
2 switching circuitry comprises processing circuitry and the resources comprise at least part
3 of the processing circuitry.

1 19. The method of reserving resources as recited in claim 14, wherein:

2 (a) the multi-port switching circuitry comprises linking circuitry for linking nodes in the
3 computer network;

4 (b) the linking circuitry comprises a limited bandwidth; and

5 (c) the resources comprise at least part of the linking circuitry bandwidth.

1 20. The method of reserving resources as recited in claim 14, wherein:

2 (a) the multi-port switching circuitry comprises adapter circuitry for connecting to an
3 external entity; and

4 (b) the resources comprise at least part of the adapter circuitry.

1 21. The method of reserving resources as recited in claim 11, wherein the step of reserving
2 resources comprises the step of limiting movement of the head so as to constrain the head
3 to a predetermined region of the disk.

- 1 22. A computer network comprising:
- 2 (a) a plurality of interconnected computer devices including a plurality of client
- 3 computers and a plurality of disk drives for storing network data, each disk drive
- 4 comprising a head and a disk;
- 5 (b) a plurality of interconnected nodes; and
- 6 (c) a reservation facility for reserving resources within the disk drives and the nodes to
- 7 support a predetermined Quality-of-Service constraint with respect to data transmitted
- 8 between the disk drives and the client computers through the nodes of the computer
- 9 network.
- 1 23. The computer network of claim 22, wherein the resources comprise memory for buffering
- 2 data.
- 1 24. The computer network of claim 22, wherein the resources comprise network circuitry for
- 2 communicating with the computer network.
- 1 25. The computer network of claim 24, wherein:
- 2 (a) the network circuitry comprises multi-port switching circuitry for simultaneously
- 3 transmitting data in multiple dimensions through the computer network; and
- 4 (b) the resources comprise a virtual lane within the multi-port switching circuitry.
- 1 26. The computer network of claim 25, wherein data is queued within each virtual lane in
- 2 order of arrival into the switched node.
- 1 27. The computer network of claim 25, wherein data is queued within each virtual lane with
- 2 respect to transmission deadlines associated with the data.
- 1 28. The computer network of claim 25, wherein the multi-port switching circuitry comprises
- 2 processing circuitry and the resources comprise at least part of the processing circuitry.

- 1 29. The computer network of claim 25, wherein:
- 2 (a) the multi-port switching circuitry comprises linking circuitry for linking the nodes in
- 3 the computer network;
- 4 (b) the linking circuitry comprises a limited bandwidth; and
- 5 (c) the resources comprise at least part of the linking circuitry bandwidth.
- Al Cont 4 30. The computer network of claim 25, wherein:
- 2 (c) the multi-port switching circuitry comprises adapter circuitry for connecting to an
- 3 external entity; and
- 4 (d) the resources comprise at least part of the adapter circuitry.
- 1 31. The computer network of claim 22, wherein the reservation facility limits movement of
- 2 the head so as to constrain the head to a predetermined region of the disk, thereby
- 3 reserving a resource within the disk drive.
- 4 32. The computer network of claim 22, wherein each node comprises multi-port switching
- 5 circuitry for simultaneously transmitting data in multiple dimensions through the
- 6 computer network.

1 33. A computer network comprising:

- 2 (a) a plurality of interconnected computer devices including a plurality of disk drives for
3 storing network data, the disk drives each comprising a head and a disk;
4 (b) a plurality of interconnected nodes; and
5 (c) a reservation facility for reserving resources within the disk drives and the nodes to
6 support a predetermined Quality-of-Service constraint with respect to data transmitted
7 between the disk drives through the nodes of the computer network.

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- 1 34. A switched fabric computer network comprising:
- 2 (a) a plurality of interconnected nodes for simultaneously transmitting data in multiple
- 3 dimensions through the computer network, each node comprising:
- 4 switching circuitry comprising more than two bi-directional ports;
- 5 a disk for storing data; and
- 6 a head actuated over the disk for writing data to and reading data from the disk;
- 7 (b) a reservation facility for reserving resources associated with data read from the disk
- 8 and written to the disk to support a predetermined Quality-of-Service constraint with
- 9 respect to data transmitted between the interconnected nodes and client computers
- 10 connected to the switched fabric computer network; and
- 11 (c) a scheduling facility, responsive to the resources reserved by the reservation facility,
- 12 for scheduling the transmission of data through the interconnected nodes to support
- 13 the predetermined Quality-of-Service constraint.
- 1 35. The switched fabric computer network of claim 34, wherein the resources comprise
- 2 memory for buffering data.
- 1 36. The switched fabric computer network of claim 34, wherein the resources comprise
- 2 network circuitry for communicating with the switched fabric computer network.
- 1 37. The switched fabric computer network of claim 34, wherein:
- 2 (a) the switching circuitry comprises a plurality of virtual lanes; and
- 3 (b) the resources comprise at least one of the virtual lanes.
- 1 38. The switched fabric computer network of claim 37, wherein data is queued within each
- 2 virtual lane in order of arrival into the switched node.
- 1 39. The switched fabric computer network of claim 37, wherein data is queued within each
- 2 virtual lane with respect to transmission deadlines associated with the data.

1 40. The switched fabric computer network of claim 34, wherein the switching circuitry
2 comprises processing circuitry and the resources comprise at least part of the processing
3 circuitry.

1 41. The switched fabric computer network of claim 34, wherein:
2 (a) the switching circuitry comprises linking circuitry for linking to other switched nodes
3 in the computer network;
4 (b) the linking circuitry comprises a limited bandwidth; and
5 (c) the resources comprise at least part of the linking circuitry bandwidth.

1 42. The switched fabric computer network of claim 34, wherein:
2 (e) the switching circuitry comprises adapter circuitry for connecting to an external
3 entity; and
4 (f) the resources comprise at least part of the adapter circuitry.

1 43. The switched fabric computer network of claim 34, wherein the reservation facility limits
2 movement of the head so as to constrain the head to a predetermined region of the disk,
3 thereby reserving a resource within the node.